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THE SPECIES OF CACTI COMMONLY CULTIVATED UNDER THE GENERIC NAME ANHALONIUM.

BY CHARLES HENRY THOMPSON.

Diversities of opinion are so prevalent as to just what plants should be included in this group, as well as to the validity of a generic separation of the two forms from Mamillaria and Echinocactus respectively, that naturally much confusion has arisen. The object of this paper is not so much an attempt at a monograph as it is to bring together the literature of the various species, with illustrations of each, photographed from living plants, and in addition to give such notes as I have taken in my observations and studies of the plants grown in the Missouri Botanical Garden.

I shall treat the group as being made up of two distinct genera, in that respect following Coulter's revision of the order.

ANALYTICAL KEY.

I. Tubercles evident, the exposed surface triangular in outline; the epidermis cartilaginous in texture. ARIOCARPUS.
  Upper surface of the tubercles with a longitudinal wool-bearing groove along the median line.
    Upper surface of tubercles strongly and irregularly fissured, 11–13 mm. long by 1.5–2.5 cm. broad. *A. fissuratus.*
    Upper surface of tubercles flat and finely papulose, about one cm. broad and half as long. *A. Kotschubeyanus.*
  Upper surface of tubercles not grooved.
    Tubercles reflexed and closely imbricated, giving a flat surface to the top of the plant. Upper surface slightly wavy to wrinkled, tinted with dull reddish-brown. *A. furfuraceus.*
    Tubercles more open, squarrosely spreading, more elongated, gray-green. *A. retusus.*
II. Tubercles scarcely evident; ribs quite prominent: plants decidedly succulent; epidermis flexible. LOPHOPHORA.
  Ribs commonly 8, quite regular. *L. Williamsii.*
  Ribs commonly 13, irregular to much broken. *L. Lewinii.*

ARIOCARPUS.*

Plants simple or very rarely cespitose, depressed top-shaped. Tubercles imbricated, radiating from the crown they form a rosette, made up of two parts comparable to the blade and claw as exemplified in some flowers. The lower portion or claw is flattened and more or less appressed along the body of the plant, the upper part or blade is reflexed, consisting of a more or less pyramidal body whose upper surface is triangular in outline. The entire surface of the blade is covered with a tough cartilaginous coat. This covering, and the absence of spines, separate these plants from Mamillaria, to which they are commonly referred and to which they are more closely related than to any other genus.

ARIOCARPUS FISSURATUS (Engelm.) K. Sch. in Engler-Prantl's Natür. Pflanzenfamilien 3^{6a}: 195. 1894.

Mamillaria fissurata, Engelm. Syn. Cact. 270. 1856.—Watson, Cactus Culture 160. *fig. 61*. 1894.

Anhalonium fissuratum, Engelm. Bot. Mex. Bound. 75. *pl. 16*. 1859.—L'Illustr. Hortic. **16**: 79. *1 fig*. 1869. Förster's Handb. Cact. 234. *fig. 20*. 1886 [ed. Rümpler].—Blanc, Catal. and Hints on Cacti 13. *no. 2*. 1888 [2nd ed.].—Baltimore Cactus Journ. **2**: 247. *1 fig*. Jan. 1896.

This species is perhaps the most common one in cultivation, appearing in nearly every cactus lover's collection. It is so characteristic and well defined in its structure that it is entirely unnecessary to dilate upon it, since what would be written could only be a repetition of the work of former authors. Our plate gives an accurate representation of its habit of growth as well as the characteristic detail structure of the tubercles. An excellent plate with detail drawings is given in Engelmann's Botany of the Mexican Boundary. The portion of this plate showing the habit has been reproduced in the other publication cited above, and is also extensively used to illustrate dealers' catalogues both in America and Europe.— Plate 32.

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* Scheidw. Bull. Acad. Royal Scien. Bruxel. **5**: 491. 1838. *Anhalonium*, Lem. Cact. 1. 1839.

ARIOCARPUS KOTSCHUBEYANUS (Lem.) K. Sch. in Engler, Bot. Jahrb. **24**: 544. *1 pl.* 1898.

Anhalonium Kotschubeyanum, Lem. in Cels Catal., in Bull. Cercle Confer. Hort. Dep. Seine. 1842 (vide K. Schumann, l. c.).

Anhalonium sulcatum, Salm-Dyck, Cact. Hort. Dyck. 5, 78. 1850 [2nd ed.].

Anhalonium Kotschubeyi, Lem. ex Salm-Dyck, Cact. Hort. Dyck. 5. 1850 [2nd ed.].

Anhalonium fissipedum, Monv. Cat. ex Förster's Handb. Cact. 232. 1886 [ed. Rümpler].

Anhalonium Kotschoubeyanum, Chr. Lem. l. c.

Stromatocactus Kotschoubey, Karw. l. c.

Ariocarpus sulcatus (Salm-Dyck) K. Sch. in Engler-Prantl's Nat. Pflanzenfamilien 3^{6a}: 195. 1894.—K. Sch. Monats. für Kakteenk. 7: 9. *1 fig.* 20 Jan. 1897.

This interesting species was first introduced into European gardens in 1845 by Karwinski but soon disappeared, so that in later years when Dr. Engelmann was studying the family he was unable to find either living or herbarium material of it.* For nearly half a century it remained in obscurity, known only by its early record, until only a few years ago it was again discovered in its home in Mexico. Since that time it has found a place in many collections throughout the United States. The Missouri Botanical Garden received its first specimen only recently, through the purchase of the cactus collection of Mr. J. A. Becker of Baltimore, Md. Our plate is from a photograph of this plant. Like *A. fissuratus* it is characteristic in its habit and details and not to be confused with any other species. These features the plate gives so well as to insure the ready determination of a plant compared with it. At present I am able to refer to but one other figure, that above cited, which is a very good illustration of the plant. The same figure is used in both the places cited.— Plate 33.

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* Engelmann, Dr. George. Botany of the Mexican Boundary 75. 1859.

ARIOCARPUS FURFURACEUS (Watson).

Mamillaria furfuracea, Watson, Proc. Amer. Acad. **25**: 150. 1890.
Anhalonium furfuraceum, (Watson) Coulter, Contr. U. S. Nat. Herb. **3**: 130. 10 June, 1894.

This species seems to have never before been figured. Our plate is from a photograph of a plant received in the collection of Mr. J. A. Becker, before mentioned, under the name *Anhalonium prismaticum*, but a comparison with Dr. Watson's description as well as with his type material (Pringle no. 2580, 1889) leaves no question of doubt but that it is the Watson species. The characteristic flatness of the head is clearly shown as well as the slight wrinkling of the triangular upper surface of the tubercles. Another feature which is prominent in both the type specimen and our own plant is the peculiar bronze appearance of the surface of the tubercles. In comparison with *A. retusus* this species has a comparatively shorter tubercle, the upper surface of which is more nearly equilateral triangular.—Plate 34.

ARIOCARPUS RETUSUS, Scheidw. Bull. Acad. Royal des Sciences de Bruxelles **5**: 492. *1 pl.* 1838.

Mamillaria prismatica, Lem. Hort. Univ. **1**: 231. 1839.
Anhalonium prismaticum, Lem. Cact. 1. 1839.— Blanc, Catal. and Hints on Cacti 12, *no. 1.* 1888 [2nd ed.].—Bot. Mag. iii. **49**. *pl. 7279.* 1893.— Baltimore Cactus Journ. **2**: 266. *1 fig.* Feb. 1896.
Anhalonium retusum, Salm-Dyck, Cact. Hort. Dyck. 15. 1845.
Cactus prismaticus, Kuntze, Rev. Gen. Plant. 261. 1891.

This species is the oldest and, next to *A. fissuratus*, perhaps the most common in cultivation. A quite full description with a good plate showing the plant in natural size were first published by Scheidweiler and this publication forms the basis for the type of both the genus and this species. It seems, however, from the different publications, that the species is very variable in form, and this variation is well marked in those illustrations which have been published. Considering Scheidweiler's figure as the type, — and, in my judgment, it is a good medium of the forms, — we may with advantage compare the others with it. The plant illustrated in the Botanical Magazine may be considered to represent the extreme variation in one direction, in which the tubercles are much shorter and more plump, and the wool-bearing apical areola quite prominent. In so far as I am able to gather any information concerning *A. pulvilligerus*, Lem.,* this seems to be the extreme variation in the contrary direction, in which the tubercles are distinctly prismatic and very much elongated. This also is described as bearing a prominent wool-bearing terminal areola. However, the presence of this areola appears to be inconstant both from the descriptions by different authors as well as from the plates, — the plate of Scheidweiler showing none. The figure in Blanc's catalogue, taken from a photograph, shows an intermediate stage between the Botanical Magazine plate and the type, in its form of tubercles as well as the small areola. This figure is quite extensively copied in the various dealers' catalogues both in America and Europe. Our own illustration shows a variation from the type toward *A. pulvilligerus*, having the same shaped tubercles, not prominently widening at the base, though considerably diminished in size. It is destitute of the terminal areola and in that respect and the smaller sized tubercles it approaches more nearly the type. This plant was growing in the Garden at the time of Coulter's study of the order, so it must have passed under his observation and been considered to be of this species. In suggesting the probable identity of *A. pulvilligerus* with *A. retusus* I might add that in all the descriptions that I have seen of the species, where the color is mentioned it is given as of some shade of gray. Whether the color is a constant feature I am unable to state, though it appears to be so. If it be true, the gray color of the tubercle would add a point in favor of the union of the two species and at the same time distinctly separate them from *A. furfuraceus*. — Plate 35.

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* *Anhalonium pulvilligerus*, Lem. Hort. Univers. **1**: 275. 1839.—*Anhalonium elongatum*, Salm-Dyck, Cact. Hort. Dyck. 77. 1850 [2nd ed.].

LOPHOPHORA.[*]

Plants simple or cespitose, depressed-globose to top-shaped or even short clavate, ribbed. Ribs bearing inconspicuous low tubercles on the summits of which appear the flower-bearing areolae. Areola round, spineless and bearing a tuft of straight, moderately long, silky hairs. In the presence of the ribs with the areolae distributed upon them in regular order, this genus approaches more nearly to Cereus or Echinocactus, and to the latter it has been referred by some authors. From a study of the vegetative character my conviction is that it constitutes a well defined genus. It differs from Echinocactus in having but the one kind of areola, and this always circular in outline, and in the total absence of spines. Furthermore the plant is more succulent in growth than in that genus. In these characters it is even further removed from Mamillaria and Ariocarpus. Its nearest relationship seems to be to the mamillate forms of Echinocactus.

LOPHOPHORA WILLIAMSII (Lem.) Coulter, Contr. U. S. Nat. Herb. **3**: 131. 10 June, 1894.

Echinocactus Williamsii, Lem. in Allg. Gart. Zeit. **13**: 385. 1845. — Bot. Mag. iii, 3. *pl. 4296.* 1847. — Monats. für Kakteenk. 4: 37. *1 fig.* 20 March, 1894.

Anhalonium Williamsii, Lem. in Förster's Handb. Cact. 233. 1886. [ed. Rümpler].— Blanc, Catal. and Hints on Cacti 13, *no. 3.* Jan. 1888 [2nd ed.]. — Gartenflora **37**: 411. *fig. 5.* 1 Aug. 1888. — Baltimore Cactus Journ. **2**: 247. *1 fig.* Jan. 1896.

The characteristic form and habit of growth in this species are well portrayed in the accompanying plate. The illustration is from one of the largest plants and shows the characteristic convex, almost unbroken ribs. The division of these ribs into rows of tubercles is indicated only by a faint, short, horizontal line just below each areola and in some instances by the slightly sinuous direction taken by the groove between the ribs, though commonly this is, relatively, a straight line. Our figure represents a plant with ten of these ribs, the greatest number I have yet found for the species. Though this number is not especially rare, yet by far the most common number is eight, and rarely seven. The figure in the Botanical Magazine is a very excellent one in every respect. That in Blanc's catalogue is also good and is the one commonly seen in dealers' catalogues. The only one of the above cited figures that is at all questionable is Hennings' illustration in Gartenflora. If it truly is this species it must certainly have been taken from a very much depauperated plant. Certain it does not represent the typical species of the description nor does it in any way compare favorably with the two previously published figures. From the prominence of the tubercles it might readily be taken for a withered specimen of the following species. Our plate represents the true species as received from a number of different collectors and dealers.— Plate 36.

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[*] Coulter, Contr. U. S. Nat. Herb. **3**: 131. 10 June, 1894.

LOPHOPHORA LEWINII (Hennings).

Anhalonium Lewinii, Hennings, Gartenflora **37**: 410, *figs. 1–4.* 1 Aug. 1888.— Monats. für Kakteenk. **1**: 90. *1 pl.* Oct. 1891.

Lophophora Williamsii Lewinii, Coulter, Contr. U. S. Nat. Herb. **3**: 131. 10 June, 1894.

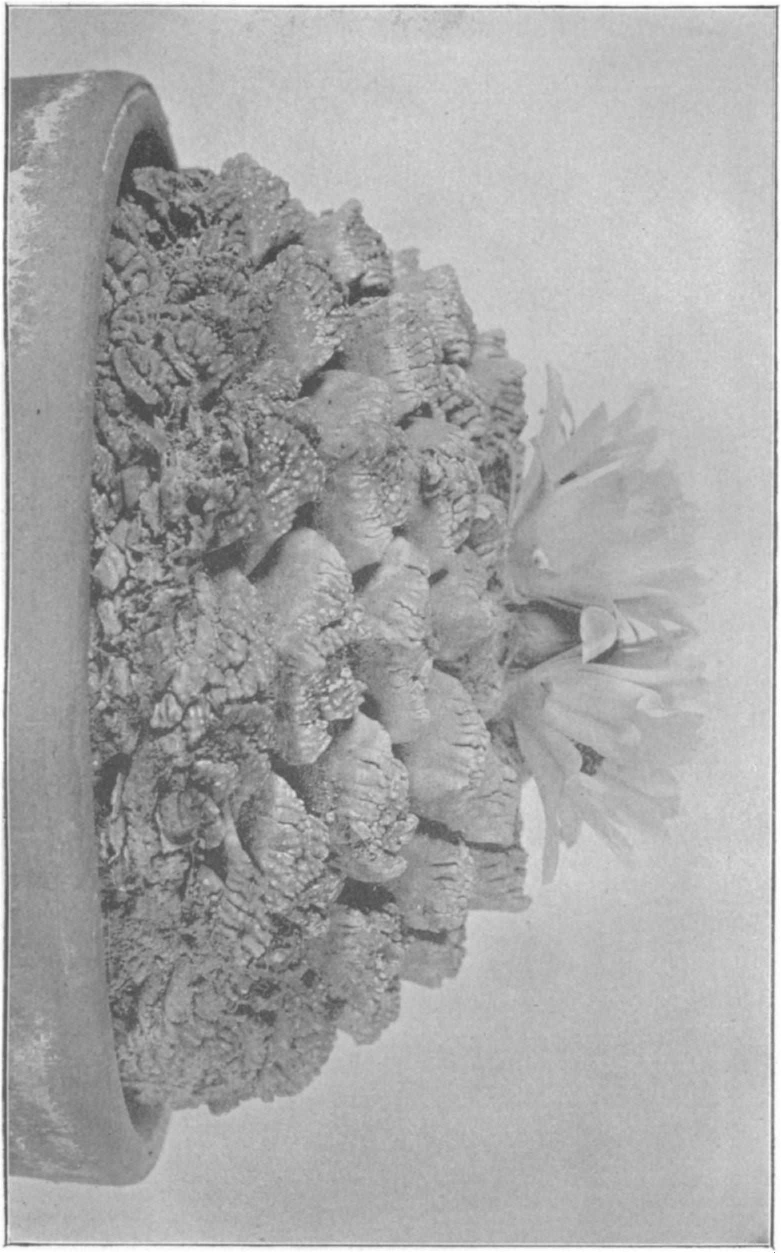
Echinocactus Lewinii, Hennings, Monats. für Kakteenk. **5**: 94. June, 1895.

Though this species is somewhat more variable in the arrangement of its tubercles than the last, yet it seems to me in every instance to be readily distinguished and separable. The ribs, when distinct, are usually thirteen in number, though not uncommonly as few as nine. In these more regularly formed plants the groove between the ribs is very strongly sinuous. By far the most common form, and that shown in our illustration, is the one in which these ribs are divided into irregularly outlined tubercles by secondary grooves obliquely intersecting two primary grooves at the point of constriction in the rib between two superposed areolae. While these limiting grooves give a conspicuous tuberculate appearance to the surface of the plant, at the same time the tubercles themselves do not prominently rise above the general surface. The plants at the Garden have been received from various sources and the one which furnishes us our illustration seems to be typical of the species as handled by dealers. Hennings, in his original description in Gartenflora, used a boiled-up dried specimen as the subject of his illustration. This is always unsatisfactory, and in this instance it seems that some discrepancies have crept in. A comparison of the illustration with our own will show scarcely any resemblance, though it is possible to see how a plant such as our own might, in drying, take on the prominent tubercular form he figures. But I am unable to account for the large cushion of silky hairs which covers the entire crown of the plant in his illustration. Such an instance has never as yet come under my own observations, neither have I heard of anyone else seeing anything like it in this group of cacti. Hennings received his type material from Parke, Davis and Co., of Detroit, Mich., and to dispel any doubt that our plant is *L. Lewinii* I secured a living specimen of the plant from this firm, one they consider typical of the species. This plant is exactly the same in characters as the one we here reproduce in our illustration. The illustration given in Monatsschrift für Kakteenkunde is almost equally unsatisfactory in presenting the prominent features of this species. To me it appears to be no more than an unusual form of *L. Williamsii* in which the characteristic number (eight) of ribs is shown, though they are perhaps a little more inclined to be tuberculate. The grooves are deeper and the plant body more elongated than in any specimens I have yet seen in either species. — Plate 37.

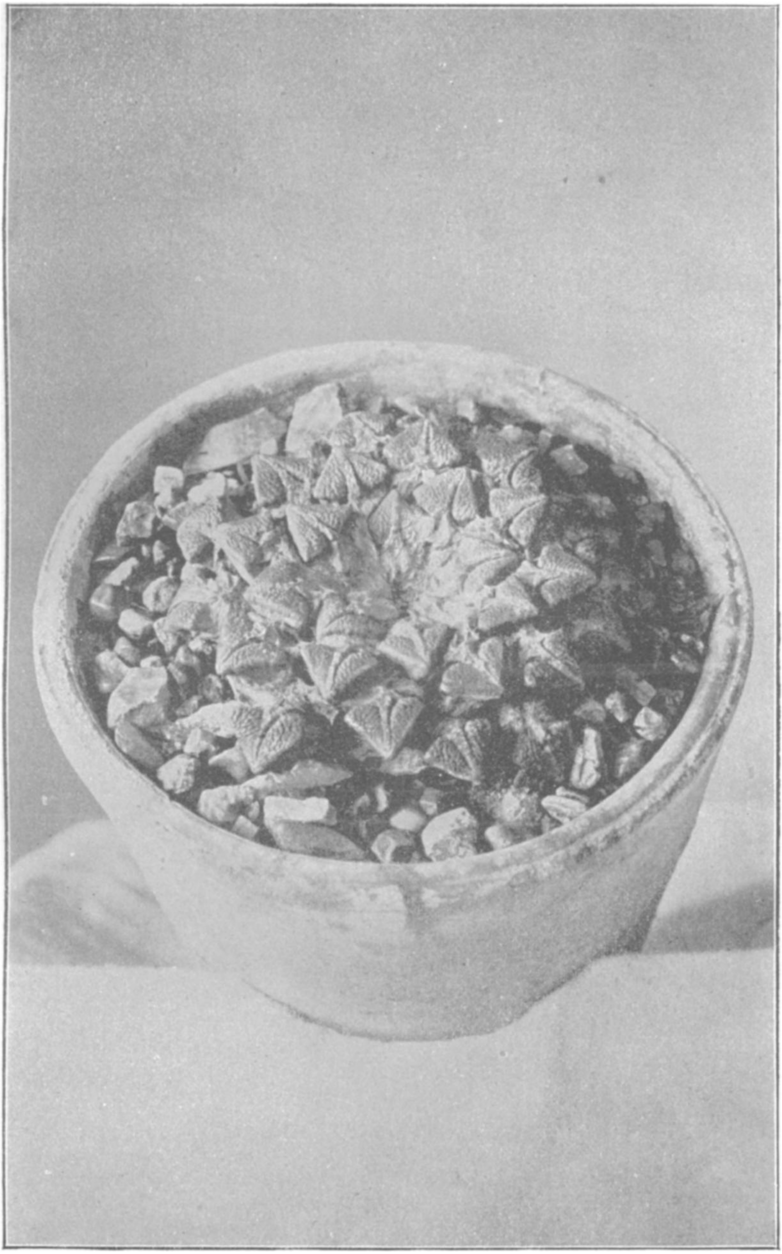
EXPLANATION OF PLATES ILLUSTRATING ARIOCARPUS AND LOPHOPHORA.

The plates are all reproductions of photographs taken of plants now growing in the Missouri Botanical Garden. The figures are presented in natural size.

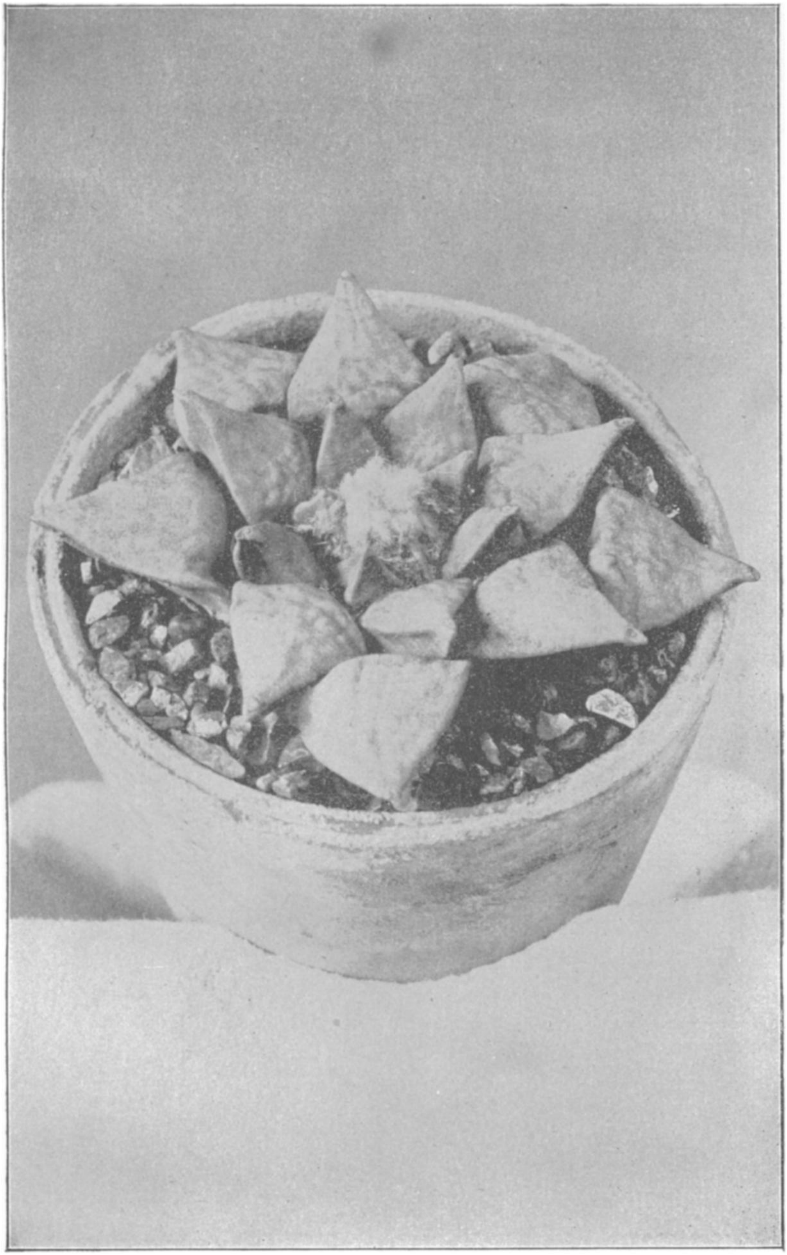
Plate 32. *Ariocarpus fissuratus.*
Plate 33. *Ariocarpus Kotschubeyanus.*
Plate 34. *Ariocarpus furfuraceus.*
Plate 35. *Ariocarpus retusus.*
Plate 36. *Lophophora Williamsii.*
Plate 37. *Lophophora Lewinii.*



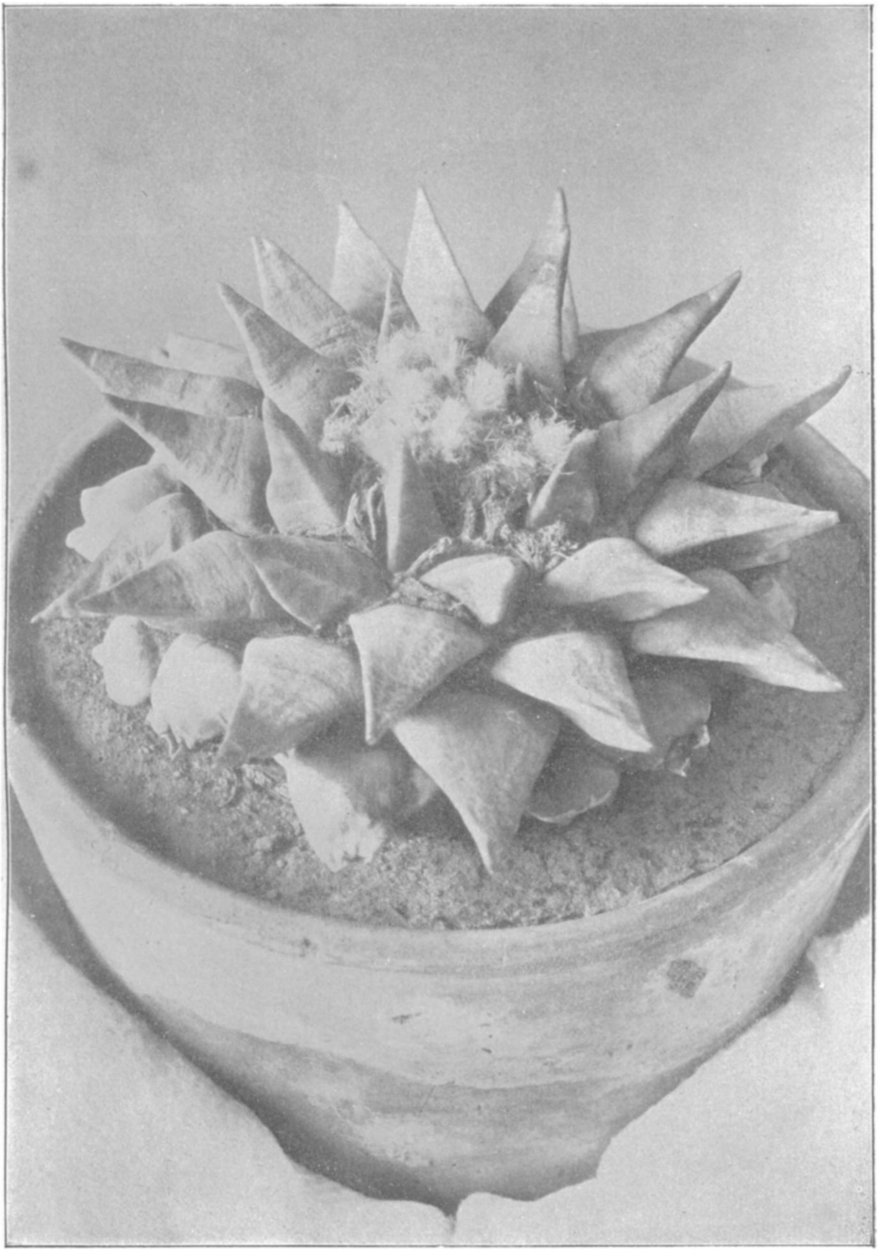
ARIOCARPUS FISSURATUS.



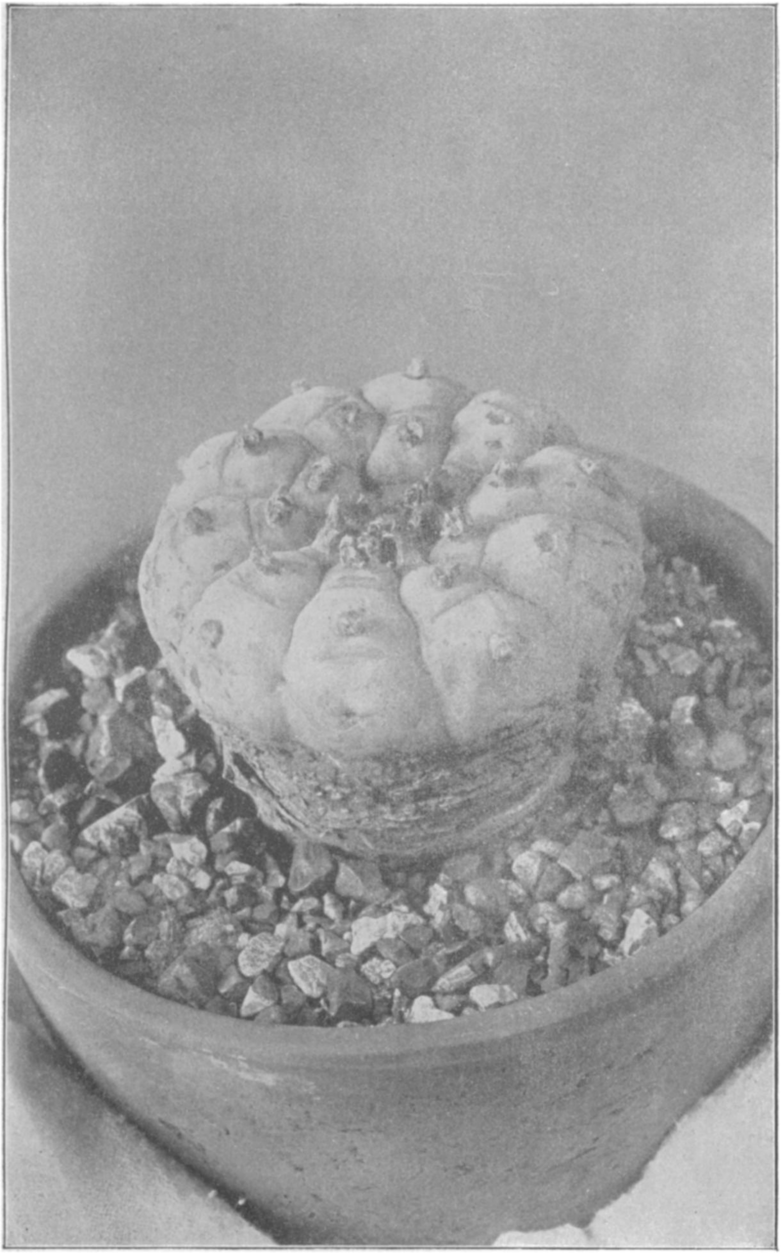
ARIOCARPUS KOTSCHUBEYANUS.



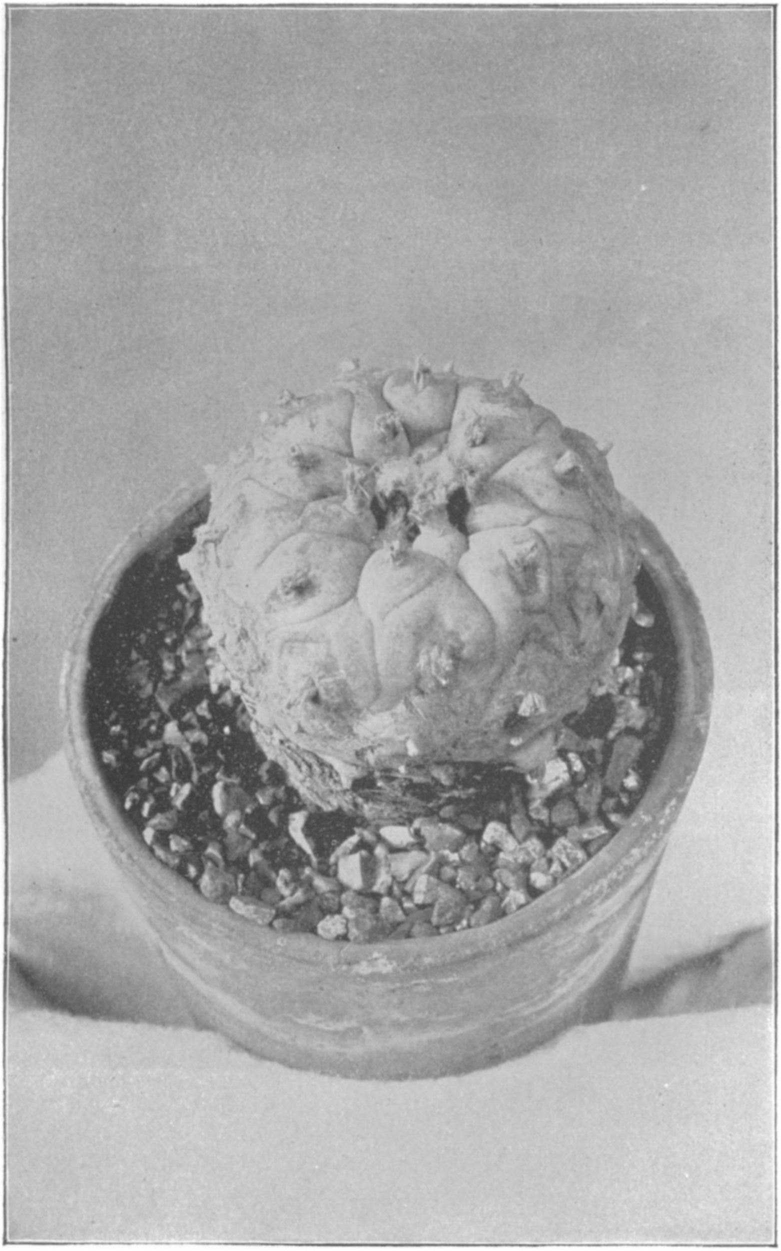
ARIOCARPUS FURFURACEUS.



ARIOCARPUS RETUSUS.



LOPHOPHORA WILLIAMSII.



LOPHOPHORA LEWINII.